EXHIBIT #5

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of:

APPLICANTS: Terhi Tuulikki RAUTIAINEN et al.

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EXAMINER: Elnafia, Saifeldin ART UNIT: 2625

ATTORNEY'S DOCKET NO.: 800.1214.U1 (US)

TITLE: GESTURE CONTROL

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO OFFICE ACTION

This paper is herewith filed in response to the Examiner's Office Action mailed on June 24, 2014 for the above-captioned U.S. Patent Application. As this response is herewith filed within the shortened statutory period no petition for an extension of time or late fee is believed to be due. However, should the undersigned attorney be mistaken, please consider this a petition for any extension of time that may be required to maintain the pendency of this Patent Application, and charge deposit account no. 50-1924 for any required fee deficiency.

AMENDMENTS TO THE CLAIMS:

This listing of the claims will replace all prior versions, and listings, of the claims in this application.

Listing of Claims:

1. (Currently Amended) An apparatus comprising:

at least one processor; and

at least one memory including computer program code, where the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus to at least:

transmit radio signals that are at least partially reflected by a human body of a user of the apparatus;

receive the transmitted radio signals after having been at least partially reflected by the human body of the user;

detect in the received radio signals a predetermined time-varying modulation caused by the human body of the user and that is present in a modulation of the received radio signals as compared to a modulation of the transmitted radio signals, wherein detecting the predetermined time-varying modulation of the received signal comprises detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar from the apparatus;

associate the detected predetermined time-varying modulation with a predetermined user input command; and

based on the associated predetermined user input command change an operation of the apparatus.

2. (Curently Amended) An apparatus as claimed in claim 1, wherein the ~~time-varying modulation of the received signal comprises a doppler frequency shift in the transmitted radio signals~~ doppler frequency shift comprises a frequency modulated continuous wave variation caused by the human body of the user.

3. (Previously Presented) An apparatus as claimed in claim 1, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to determine from the predetermined time-varying modulation of the received radio signal one or more kinematic parameters that parameterize a gesture by the human body that caused the time-varying modulation including at least a speed or velocity parameter.

4. (Previously Presented) An apparatus as claimed in claim 3, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to detect the one of more kinematic parameters to resolve at least one of a position and a velocity of the gesture in two or three dimensions.

5. (Previously Presented) An apparatus as claimed in claim 2, wherein when the time varying modulation of the received signal comprises the doppler frequency shift, the time-varying modulation is characterized by a frequency shift between the received signals and the transmitted signals.

6. (Previously Presented) An apparatus as claimed in claim 1, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to maintain in a memory of the apparatus a correspondence between a time varying nature of a predetermined user input command and a time varying nature of a predetermined time-varying modulation, and to use the maintained correspondence in the memory to associate the detected predetermined time-varying modulation caused by the human body of the user with the predetermined user input command.

7. (Previously Presented) An apparatus as claimed in claim 4, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to provide slowly varying analogue control when a slowly moving continuous gesture is detected.

8. (Previously Presented) An apparatus as claimed in claim 4, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to provide binary two-state control when a fast moving gesture is detected.

9. (Previously Presented) An apparatus as claimed in claim 1, wherein the change comprises the

least one memory including the computer program code is configured with the at least one processor to cause the apparatus to change how content is presented to a user.

10. (Previously Presented) An apparatus as claimed in ~~claim 1~~claim 3, wherein the change comprises the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to change any one or more of: audio output increase, audio volume decrease, display zoom-in, display zoom-out, display scroll-up, display scroll-down, display scroll-right, display scroll-left in response to an associated detected user gesture, a telephone call state, a camera capture state, an audio output muting, and an application run status.

11. (Cancelled)

12. (Previously Presented) An apparatus as claimed in claim 1, wherein the apparatus has a front face and wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to:

transmit radio signals at least substantially normally to the front face, and

receive radio signals that are reflected towards the front face.

13. (Previously Presented) An apparatus as claimed in claim 1, wherein the apparatus comprises a plurality of radio receivers and wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to:

detect, for each of the plurality of receivers, a predetermined time-varying modulation that is present in a modulation of the received radio signals compared to the modulation of the transmitted radio signals, and

interpret the combination of predetermined time-varying modulations associated with the respective radio receivers as a predetermined user input command and change the operation of the apparatus.

14. (Previously Presented) An apparatus as claimed in claim 1, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to additionally use the radio transmitter for wireless data transmission.

15. (Previously Presented) An apparatus as claimed in claim 3, wherein a separate user actuation in addition to the gesture is required to enable the change in the operation of the apparatus in

response to the gesture.

16. (Previously Presented) An apparatus as claimed in claim 1, wherein the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to operate with transmission diversity.

17. (Previously Presented) An apparatus as claimed in claim 1, wherein the apparatus is user programmable to predetermine time-varying modulations for detection in the received radio signals.

18. (Currently Amended) An apparatus comprising:

a radio receiver configured to receive radio signals after having been at least partially reflected by a human body of a user of the apparatus;

a gesture detector configured to detect in the received radio signals a predetermined time-varying modulation caused by the human body of the user and that is present in a modulation of the received radio signals as compared to a modulation of the radio signals before the reflection, wherein detecting the predetermined time-varying modulation of the received signal comprises detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar from the apparatus;

an interface for providing the detected predetermined time-varying modulation as an output; and

the gesture detector configured to associate the detected predetermined time-varying modulation with a predetermined user input command, and based on the associated predetermined user input command change an operation of the apparatus.

19. (Currently Amended) The apparatus as claimed in claim 18, wherein the gesture detector is configured to determine, with respect [[to]] to the human body that provides the received radio signals, one or more kinematic parameters that parameterize a gesture by the human body that caused the time-varying modulation including at least a speed or velocity parameter.

20. (Currently Amended) A method comprising:

enabling, by an apparatus, gesture detection in response to an external event;

transmitting radio signals that are at least partially reflected by a human hand;

receiving the transmitted radio signals after having been at least partially reflected by a

gesturing human hand;

detecting a predetermined time-varying modulation, characterizing the gesture, that is present in a modulation of the received radio signals compared to a modulation of the transmitted radio signals, wherein detecting the predetermined time-varying modulation of the received signal comprises detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar; and

changing an operation of [[an]] the apparatus in dependence upon the predetermined time-varying modulation.

21. (Original) A method as claimed in claim 20 further comprising: determining one or more kinematic parameters that parameterize a gesture that causes the predetermined time-varying modulation including at least a speed or velocity parameter.

22. (Currently Amended) The ~~apparatus~~ method as claimed in ~~claim 1~~ claim 20, wherein the external event is an event without a user input when the event occurs.

23. (Currently Amended) The ~~apparatus~~ method as claimed in ~~claim 1~~ claim 20, wherein the external event is an event that occurs when the apparatus has been switched on.

24. (Currently Amended) The ~~apparatus~~ method as claimed in ~~claim 1~~ claim 20, wherein the external event is an action performed by ~~the~~ a user of the apparatus.

REMARKS:

This paper is herewith filed in response to the Examiner's final Office Action mailed on June 24, 2013 for the above-captioned U.S. Patent Application. This office action is a rejection of claims 1-10 and 12-24 of the application.

More specifically, the Examiner has rejected claims 22-24 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter applicant regards as the invention; rejected claims 1 and 3-4, 6-10, and 12-21under 35 USC 103(a) as being unpatentable over Boillot (US20070130547), hereafter referred to as Boillot '547, in view of Boillot (US20070121097), hereafter referred to as Boillot '097; and rejected claims 2 and 5 under Boillot '547, in view of Boillot '097, and further in view of Gilbert (US 6,313,825); and rejected claims 22-24 under 35 USC 103(a) as being unpatentable over Boillot '547 further in view of Boillot '097 and further in view of Movold (US20080134102). The rejections are respectfully traversed.

Claims 1-2, 18-20, and 22-24 have been amended. Support for the amendments can be found at least page 7, line 10 to page 8, line 3. No new matter is added.

Regarding the Rejection of Claims 22-24 Under 35 USC 112, second paragraph

Claims 22-24 have been amended to address the rejection. For at least these reasons the Examiner is respectfully requested to remove the rejection of these claims under 35 USC 112, second paragraph.

Regarding the Rejection of Independent Claims 1, 18, and 20

Although the rejections are not expressly or impliedly agree with, in order to facilitate the prosecution of this patent application towards allowance each of the independent claims 1, 18, and 20 have been amended in a somewhat similar fashion to recite features of claim 2. For example,

claim 1 now recites:

> An apparatus comprising: at least one processor; and at least one memory including computer program code, where the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus to at least: transmit radio signals that are at least partially reflected by a human body of a user of the apparatus; receive the transmitted radio signals after having been at least partially reflected by the human body of the user; detect in the received radio signals a predetermined time-varying modulation caused by the human body of the user and that is present in a modulation of the received radio signals as compared to a modulation of the transmitted radio signals, wherein detecting the predetermined time-varying modulation of the received signal comprises detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar from the apparatus; associate the detected predetermined time-varying modulation with a predetermined user input command; and based on the associated predetermined user input command change an operation of the apparatus

The exemplary embodiments of the invention detect at a portable device a predetermined time-varying modulation of a received radio signal caused by a reflection by a human body and that is present in a modulation of received signal as compared to modulations of the transmitted signal. In accordance with an exemplary embodiment of the invention a Doppler radar detector is configured to determine a frequency difference between a carrier frequency of the transmitted radio signals and the carrier frequency of a received radio signal. In accordance with the exemplary embodiments of the invention there is associating the detected predetermined time-varying modulation with a predetermined user input command, wherein detecting the predetermined time-varying modulation of the received signal comprises detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar. Then based on the associated predetermined user input command changing an operation of the apparatus. Further, in accordance with an exemplary embodiment of the invention the doppler frequency shift can comprise a frequency modulated continuous wave variation caused by the human body of the user. None of the references cited disclose or suggest at least these features as claimed.

In the rejection of claim 2, now similarly incorporated into claim 1, the Examiner states:

> **"Regarding claim 2,** Boillot 547 in view of Boillot 097 teaches an apparatus as claimed in claim 1 above, but Boillot 547 in view of Boillot 097 does not expressly disclosed wherein the time varying modulation of the received signal comprises a doppler frequency shift in the transmitted radio signals," (page 10 of the Office Action).

To overcome this admitted shortfall the Examiner cites Gilbert. The Examiner asserts:

> "However, Gilbert disclosed in fig. 8, col. 8 and lines 32-58 wherein the system of fig. 8 including multiple receivers to measure the velocity and displacement and measuring the phase of sent and received pulses to determine a time and a distance of the object and the switching frequency is two or more times the maximum expected Doppler frequency, that the received signal frequency can be compared with a Doppler frequency," (page 10 of the Office Action).

Although the rejection using Boillot 547 and Boillot 0097 is not agreed to, it is submitted that Gilbert does not overcome at least the above stated admitted shortfalls of Boillot 547 and Boillot 0097.

Gilbert

Gilbert relates to an input device for a computer to detect movement of an object, such as a finger, within a selected field of space, and across the boundaries of the selected space (Abstract). Gilbert discloses that a difference between the times the reflections are received can be used to determine the distance of the reflected object from the receivers (col. 8, lines 1-6).

Gilbert as cited discloses:

> "FIG. 8 describes the electrical structure of an embodiment of the invention, using multiple receivers to measure the velocity and displacement. Measuring the phase of sent and received pulses is one method for determining time and distance from the object. Once the range from two different angles is known, the position, and direction and rate of movement may be easily calculated by software in interpreter 500. Only measurement in one dimension is detailed, the second dimension uses identical circuits. An ultrasonic frequency signal generator 860 is connected to a transmitter 874 to transmit ultrasonic waves as represented by pattern 875. The waves are reflected off a surface such as a word or finger. The reflected waves are

> converted by the receiver 810A to electrical signals, which are transferred through switch 814 to a pair of phase detectors 816 and 826, where detection of the reflected waves takes place. Time switching is used to isolate between transmitter 874 and receiver 810 and to receive only from a designated range. The receiver is turned on only after the termination of the transmitted pulse. A control circuit 872 generates a first pulse train which controls a switch 871, thus switching on and off the AC signal to transducer 874, which transmits an interrupted ultrasonic wave. The switching frequency is two or more times the maximum expected Doppler frequency, so as not to interfere with the measuring process, because of Nyquist's limit," (col. 8, lines 26-58).

Here, Gilbert discloses that a set of electronics including multiple receivers is used for ultrasonic range finding and once the range from two different angles is known, the position, and direction and rate of movement may be easily calculated by software in interpreter 500. In Gilbert a control circuit 872 generates a first pulse train which controls a switch 871, thus switching on and off the AC signal to transducer 874. According to Gilbert the switching frequency is two or more times the maximum expected Doppler frequency, so as not to interfere with the measuring process, because of Nyquist's limit. It is noted that as stated above Gilbert discloses with regards to Figure 8 that "Measuring the phase of sent and received pulses is one method for determining time and distance from the object." However, the measuring the phase of the sent and received pulses as in Gilbert clearly cannot be seen to disclose or suggest at least where amended claim 1 relates to *detecting the predetermined time-varying modulation of the received signal comprising detecting a doppler frequency shift in the transmitted radio signals based on a continuous wave doppler radar*.

Proposed Combination Is Seen To Be Improper

In addition, it is submitted that a person of ordinary skill in the art would not find it obvious to somehow combine the references as asserted in the rejection. In the rejection it is asserted that the proposed combination would have been obvious to a person having ordinary skill in the art to characterize the received signal based on a Doppler frequency in order to reduce interference with the measuring process (page 10 of the Office Action). This is respectfully disagreed with.

Boillot '547 discloses:

> "At step 202, a touchless finger movement can be sensed. Referring back to FIG. 1, the processor 115 can include a detector, a controller, and a timer to determine when a finger sign is presented. The detector can determine when a finger sign is initiated. For example, during normal typing movement, from the perspective of the sensing unit, the sensing unit identifies incoherent movement. That is, when the user is typing, signals are reflected off the moving fingers causing interference," (paragraph [0039]) ; and

> "The sensing unit 110 can employ pulse-echo detection to estimate a range and position of the touchless finger movement within the touchless sensing space 101. A transmitter in the sensing unit can emit a pulse shaped signal that produces multiple reflections off the finger. The reflections can be detected by multiple receiver elements. Each receiver element can receive a reflection signal. The processor 115 can estimate a time of flight (TOF) and a differential TOF (dTOF) from each reflection signal for each receiver," (paragraph [0050]).

In Boillot '547 the detected interference appears to be used by the detector to determine when a finger sign is initiated. Boillot '547 employs pulse-echo detection to estimate a range and position of finger movement. Boillot does not disclose detecting a time-varying modulation that is present in the pulse echo as a user input command to change the operation of an apparatus. As stated above in Boillot '547 the pulse-echo of Boillot '547 identifies movement, such as finger movements, as incoherent noise or interference. For at least these reasons a skilled person would understand that if the support for the proposed combination is correct and the interference were reduced at least operations of the detector of Boillot '547 could be rendered unsatisfactory for its intended purpose.

> **MPEP 2143.01: THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE**
>
> If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon,* 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for

> removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

Further, none of the references cited overcome at least the shortfalls of Gilbert as stated above.

Boillot '097

Boillot '097 appears to disclose a method to resolve a location and movement of an object using pulse or chirp signals (paragraphs [0005]-[0007]). Boillot '097, similar to Boillot '547, uses a time of flight of received signals to determine the location and the movement of the object in order to track the object (paragraphs [0042], [0045], and [0057]. Boillot '097 does not overcome at least the shortfalls of Gilbert as stated above.

Movold

Movold relates to a method of movement detection using devices such as cameras and infrared sensors (Abstract). Movold disclose images and/or data points from these devices may be compared to each other to determine if a predetermined event has occurred (paragraph [0091]). Movold does not overcome at least the shortfalls of Gilbert as stated above.

None of the references cited overcome at least the shortfalls of Gilbert as stated above.

Therefore, for at least these reasons even if the references were somehow combined, which is not agreed to as suggested, the propose combination would still fail to disclose or suggest claim 1. Therefore, the Examiner is respectfully requested to remove the rejection and allow claim 1.

Regarding Claim 2

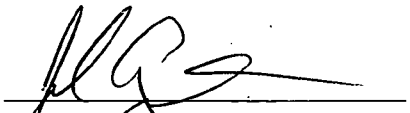
It is respectfully submitted that for at least the reasons as stated above, none of the references cited disclose or suggest at least where claim 2 now relates to wherein the doppler frequency shift comprises a frequency modulated continuous wave variation caused by the human body of the user. Thus, the Examiner is respectfully requested to allow claim 1.

In addition, for at least the reason that claims 1-17 and 22-24; claim 19; and claim 21 depend from claims 1, 18, and 20, respectively, the references cited do not disclose or suggest these claims.

Based on the above explanations and arguments, it is clear that the references cited cannot be seen to disclose or suggest claims 1-10 and 12-24. The Examiner is respectfully requested to reconsider and remove the rejections of claims 1-10 and 12-24 and to allow all of the pending claims 1-10 and 12-24 as now presented for examination.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record. Should any unresolved issue remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Respectfully submitted:



5/17/2014

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